

WHAT IS CLAIMED IS:

1. A raw material composite for a carbon material used in an electric double layer capacitor containing microcrystalline carbon having a layered crystal structure similar to graphite, the raw material composite being formed into a carbon material for an electric double layer capacitor by undergoing an activation treatment,

wherein a Hardgrove grindability index HGI defined by ASTM D-409-71 is 50 or above,

an interlayer distance  $d_{002}$  of the microcrystalline carbon determined by an X-ray diffraction method is 0.343 nm or below, and

a crystallite size  $L_{c002}$  of the microcrystalline carbon determined by the X-ray diffraction method is 3.0 nm or below.

2. The raw material composite for a carbon material used in an electric double layer capacitor according to claim 1,

wherein fine cracks are formed inside the raw material composite, and

when a pore diameter and a pore capacity are determined by a mercury injection method on an assumption that the fine cracks are pores, the pore capacity of the fine cracks having sizes corresponding to pore diameters in a range from 0.1 to 10  $\mu\text{m}$  is in a range from 0.15 to 0.40 mL/g.

3. A method of manufacturing a raw material composite for a carbon material used in an electric double layer capacitor, the raw material composite containing microcrystalline carbon having a layered crystal structure similar to graphite and being formed into the carbon material for an electric double layer capacitor by undergoing an activation treatment, the method of manufacturing a raw material composite for a carbon material used in an electric double layer capacitor comprising:

a raw material carbon preparation step of preparing raw material carbon containing the microcrystalline carbon having the layered crystal structure similar to graphite as a starting material; and

a heat treatment step of heating the raw material carbon in an inert gas atmosphere in a temperature range from 600°C to 900°C and then cooling the raw material carbon down to 100°C or below,

wherein the raw material carbon used in the raw material carbon preparation step has an interlayer distance  $d_{002}$  of the microcrystalline carbon determined by an X-ray diffraction method in a range from 0.34 to 0.35 nm,

integrated intensity of an X-ray diffraction peak corresponding to a 002 lattice plane equal to or more than 10% of graphite,

an interlayer distance  $d_{002}$  of the microcrystalline carbon is 0.337 nm or below and a crystallite size  $La_{110}$

of the microcrystalline carbon is 80 nm or more in carbon obtained after heating at a temperature of 2800°C in the inert gas atmosphere.

4. The method of manufacturing a raw material composite for a carbon material used in an electric double layer capacitor according to claim 3, wherein the raw material composite to be obtained after the heat treatment step is adjusted such that a Hardgrove grindability index HGI defined by ASTM D-409-71 is 50 or above, an interlayer distance  $d_{002}$  of the microcrystalline carbon is 0.343 nm or below, and a crystallite size  $L_{C002}$  of the microcrystalline carbon is 3.0 nm or below.

5. An electric double layer capacitor including an anode and a cathode using carbon electrodes made of a carbon material containing microcrystalline carbon having a layered crystal structure similar to graphite as a main ingredient, the anode and the cathode being arranged through a medium of an electrolytic solution,

wherein the carbon material is a material obtained by subjecting the raw material composite according to claim 1 to an activation treatment,

a specific surface area of the carbon material to be determined by a nitrogen gas absorption method is 300 m<sup>2</sup>/g or below, and

an interlayer distance  $d_{002}$  of the microcrystalline carbon of the carbon material is in a range from 0.360 to

0.380 nm.

6. The electric double layer capacitor according to claim 5,

wherein fine cracks are formed inside the carbon material, and

when a pore diameter and a pore capacity are determined by a mercury injection method on an assumption that the fine cracks of the carbon material are pores, the pore capacity of the fine cracks of the carbon material having sizes corresponding to pore diameters in a range from 0.1 to 10  $\mu\text{m}$  is in a range from 0.15 to 0.40 mL/g.

7. A method of manufacturing an electric double layer capacitor including an anode and a cathode using carbon electrodes made of a carbon material containing microcrystalline carbon having a layered crystal structure similar to graphite as a main ingredient, the anode and the cathode being arranged through a medium of an electrolytic solution, the method of manufacturing an electric double layer capacitor comprising:

a raw material carbon preparation step of preparing raw material carbon containing the microcrystalline carbon having the layered crystal structure similar to graphite as a starting material;

a heat treatment step of heating the raw material carbon in an inert gas atmosphere in a temperature range from 600°C to 900°C and then cooling the raw material carbon

down to 100°C or below so as to obtain a raw material composite for the carbon material; and

an activation treatment step of obtaining the carbon material by subjecting the raw composite for the carbon material to an activation treatment, wherein the raw material carbon used in the raw material carbon preparation step has an interlayer distance  $d_{002}$  of the microcrystalline carbon determined by an X-ray diffraction method in a range from 0.34 to 0.35 nm, and integrated intensity of an X-ray diffraction peak corresponding to a 002 lattice plane equal to or more than 10% of graphite, and an interlayer distance  $d_{002}$  of the microcrystalline carbon is 0.337 nm or below and a crystallite size  $L_{a110}$  of the microcrystalline carbon is 80 nm or above in carbon obtained after heating at a temperature of 2800°C in the inert gas atmosphere.

8. The method of manufacturing an electric double layer capacitor according to claim 7, owherein the raw material composite to be obtained after the heat treatment step is adjusted such that a Hardgrove grindability index HGI defined by ASTM D-409-71 is 50 or above, an interlayer distance  $d_{002}$  of the microcrystalline carbon is 0.343 nm or below, and a crystallite size  $L_{C002}$  of the microcrystalline carbon is 3.0 nm or below.

9. The method of manufacturing an electric double layer capacitor according to claim 7,

wherein a specific surface area of the carbon

material obtained after the activation treatment step to be determined by a nitrogen gas absorption method is 300 m<sup>2</sup>/g or below, and

an interlayer distance  $d_{002}$  of the microcrystalline carbon of the carbon material is in a range from 0.360 to 0.380 nm.

10. The method of manufacturing an electric double layer capacitor according to claim 7,

wherein fine cracks are formed inside the carbon material obtained after the activation treatment step, and

when a pore diameter and a pore capacity are determined by a mercury injection method on an assumption that the fine cracks of the carbon material are pores, the pore capacity of the fine cracks of the carbon material having sizes corresponding to pore diameters in a range from 0.1 to 10  $\mu\text{m}$  is in a range from 0.15 to 0.40 mL/g.